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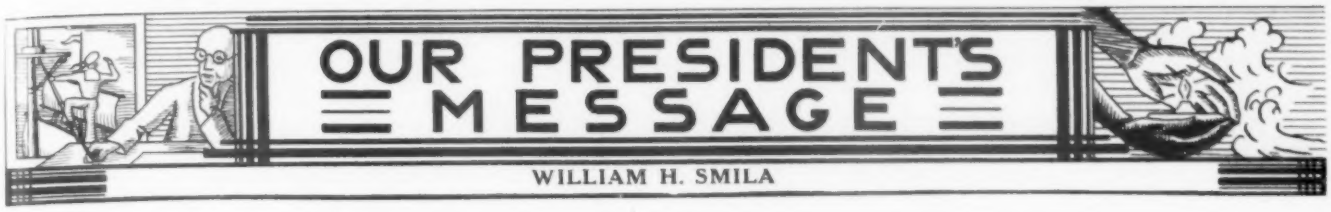
O. B. JONES, Editor

Owing to the nature of the American Society of Tool Engineers organization, it cannot be responsible for statements appearing in the Journal either as advertisements or in papers presented at its meetings or the discussions of such papers printed herein.

Address all editorial matter, advertisements, and inquiries to A.S.T.E. Journal, 8203 Woodward Avenue, Madison 8422.



ADVERTISING

EACH issue of the A.S.T.E. Journal contains considerable advertising and it is partially due to this advertising that the Journal is made possible. The firms doing this advertising are reliable and well founded Companies and Corporations having products of high quality which they wish to bring to the attention of our membership and readers at large. There is no doubt that the A.S.T.E. Journal offers an excellent medium for good advertising as it reaches practically every Factory Manager, Master Mechanic, Tool Engineer, and Tool Designer in the Detroit area besides a large number in all parts of this country and some of the foreign countries.

At the time the Publications Committee was first appointed it became its duty not only to publish the Journal but also to solicit the advertising. As this consumed considerable time on the part of a few of the members of this committee it was felt that a more equal distribution of the duties could be made by appointing a larger committee but this did not prove to be as successful as the smaller committee. It was then decided by the executive committee working in conjunction with the Publications Committee chairman to employ a professional advertising manager. This proved to be no better than our large advertising committee and not nearly as good as our smaller committee, hence, it was decided to dispense with the services of our advertising manager and resume our initial plan.

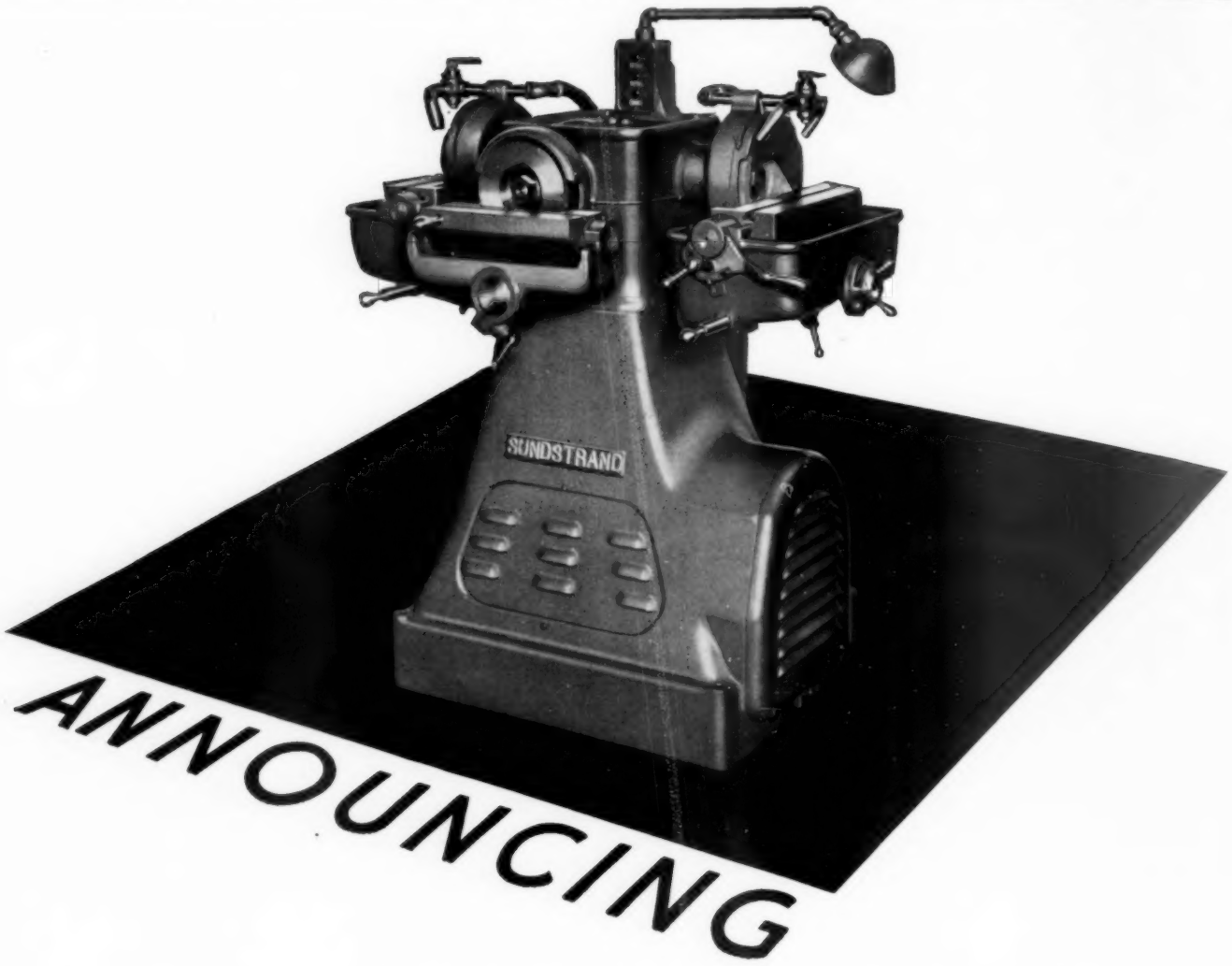
Mr. O. B. Jones, chairman of the Publications Committee was again made head of the advertising section effective with the November issue, and it was thru the efforts of his committee that the November and December issues were published. We believe we now have the real solution to this problem and are sure Mr. Jones and his committee will fully co-operate with all our advertisers. Each member can co-operate by mentioning the Journal in answering any of the ads, as it is by this means that our advertisers learn that their advertising in our Journal is effective.

We believe each machine or equipment advertiser could create a demand for his advertisements as well as his product, especially among tool engineers and tool designers, if he were to publish properly dimensioned line drawings of the machine or piece of equipment being advertised, rather than a picture of it. These line drawings should contain information relative to the capacities, distance from spindle to column or ways, length of travel, size of taper in spindle and all other pertinent dimensions needed by a designer for designing fixtures or tools for use on, or with, the machine or equipment being advertised. In addition a table or chart should give the overall dimensions, total weight, size and speed of motor, and other information of this nature. This may be a different kind of advertising than some of our advertisers have tried but we believe that if they were to canvass the readers of their ads they would find the reader would not only welcome but prize such information.

In conclusion and on behalf of the society I wish to take this opportunity of thanking each and every advertiser in our Journal for their co-operation and patronage.

To the members and their families, as well as our advertisers, I wish you a Merry Christmas and a Happy and Prosperous New Year.

"See page 7 for important next meeting announcement."



ANNOUNCING

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NEXT MEETING

DESIGN, HISTORY, AND STANDARDIZATION OF GAGES

By

DAVID W. OVIATT

DETROIT-LELAND HOTEL THURSDAY, DECEMBER 14

8:00 P.M.

This meeting will be devoted entirely to gages, gaging history, and practice. The subject will be presented by Mr. David W. Oviatt, who at present is engaged at special assignment duty in the staff master mechanic's office of the Dodge Brothers Corporation.

Mr. Oviatt needs no introduction to the tool engineering world for he is widely known as an authority on gaging and the many phases of tool engineering. His articles on these subjects have appeared in popular engineering magazines, and he has addressed many meetings throughout the country.

One of his most remarkable works is a treatise on "Tolerances on Cylindrical Fits."

Mr. Oviatt was formerly with the General Motors Corporation, during which time he served as chairman of the General Motors Tool Standards Committee. He also had charge of efficiency engineering for the Buick Motor Car Company. Mr. Oviatt is a member of a dozen or more national committees on standardization of tools and gages. He has officiated as chairman of several such committees.

Manufacturers Display Their Wares

Through the cooperation of the principal gage manufacturers represented in the Detroit area, the following companies will display their products at the Detroit-Leland Hotel in the ballroom in which the meeting will be held. Their displays will harmonize with the speakers subject and will depict the latest gaging and inspection apparatus.

Federal Products Corporation
B. C. Ames Co.
Sheffield Machine & Tool Co.
Swedish Gage Company of America.

DAVID W. OVIATT

LAST MEETING

The following paper was presented at the November meeting at the Detroit-Leland Hotel.

PATTERNS

By VAUGHAN REID*

WE understand that at one of your previous meetings here you had a representative of the Welding Industry explain to you why welded iron was cheaper, and possibly better for tool work and general casting work where one or a few were needed. I also understand that our friend, Mr. Harry Dietert and myself are brought here tonight to try and explain to you why an iron casting is better and cheaper than a welded piece. As I have seen several machines built with welded parts, I am sure it will not be a hard task to accomplish our purpose.

I have seen some welded parts assembled, and I am sure that if each operation used in the making of those parts were properly totalled, and all of these operations added to the total cost of that piece that the cost of the pattern and the making of the casting would be much less in many instances.

I am sure that our friend, Mr. Dietert, will be able to explain to you why the welded part has more vibration, and is not as strong as a good grey iron casting.

*President of the National Association of Pattern Manufacturers. President of City Pattern Works, Detroit.

"See page 7 for important next meeting announcement."

Most plants consider the cost of a pattern as a necessary evil, and in some cases I agree with them, but I would like you always to bear in mind that when a pattern for a tool is made properly and checked properly, you will always find that the cost of machining that tool or fixture or machine casting will be much less.

It seems to be the common practice, especially in tool shops, that they must get their patterns made for little or nothing, forgetting at the same time that the pattern is a tool in itself for the foundry, and if the foundry does not get the proper tool to work with, you can not expect a good casting of that part.

I have seen many patterns made that looked to me more like models, rather than foundry equipment. The molder would have to spend twice as long as he should to make that particular casting because in the first place the pattern was never made to be used for a pattern. If we could only get the toolmakers to think of the work of the molders, better and stronger castings could then be produced.

One of the best illustrations that we have found in this regard is when a pattern is made to be molded entirely in green sand with so many loose pieces attached to it, when part of the job should be made in a core, and the loose pieces put in the corebox instead.

When a pattern of this type is made entirely in green sand, many times the molder has to rap the pattern far too much to get the castings that you would like to have, where in these cases if the pockets of the particular job were made in the core room it would reduce the molder's time considerably as well as the total cost.

We have all made many complaints of the casting weighing much more than the estimated weight from the blueprint. In many cases that can be caused by over rapping of the pattern because it has not been built correctly, or the pattern has had insufficient draft.

In fact, we have all seen some patterns made that would have to be turned outside-in to be able to remove them from the sand, so I can not stress too much the necessity of having all the draft possible on the patterns. In other words, give the foundryman a chance to make good castings for you.

Now, we have talked about the type of patterns which should be given to the foundrymen, and I would like to say a word about the drawings that should be furnished to the patternmakers.

Most patternmakers, who understand their business at all, and have had some foundry experience, are very desirous of making patterns so that good castings would result. They know what the foundryman is up against, and they work accordingly, but even these men must have the necessary information that should be on the drawings. Many of the tool designers put this information on all their drawings, but many do not, and that is why I am mentioning it at this time.

It is very hard for the average patternmaker to know just how much finish should be left on the various finished surfaces of a casting so the amount of finish should always be noted after the letter "f."

It should also be noted on the drawings which is the most important side of each casting so that the patternmaker will know what side to put in the lower or drag half of the mold.

We have also seen many designs with numerous bosses on various sides, and we sometimes wonder if the engineer has considered the amount of work necessary to put those bosses on the location where they should be. Sometimes a few added ounces of metal to run those bosses straight to the bottom, or top, as the occasion may require, would save many times the cost of the metal in the cost of the building of the pattern, and the making of the mold or core.

As we look back a number of years, we rememebr well the design of many of our automobile cast crankcases which were quite difficult to cast on account of the many loose pieces and undercuts on each side, and the engineers at that time told the pattern shops they could not be designed any better or differently as they had to have them there, and they would just have to be made accordingly, but through the years there has been a continual advancement in the methods of making the various castings and patterns. As we all know today, there are no difficult castings on our present automobile for the simple reason that the patternmakers and the designers of these castings have conferred with each other, and cooperated with each other.

We often feel that the tool engineers have not conferred enough with the patternmakers to find out just how their castings can be simplified. I do not know of any one in the pattern business who would not gladly sit at the board and discuss any casting problem with any of you gentlemen.

In tool work and machine building there are certain standards set up to enable engineers to simplify their work, so have standards been set up by the American Foundrymen's Association for the patternmakers to simplify their work, but I believe you gentlemen live up to your standards a little more than the patternmakers can live up to theirs.

We have had numerous committees at work in the American Foundrymen's Association who have spent a great deal of time and effort in designing these standards, and if any of you gentlemen would care to have a copy of the specifications for wood patterns, you may obtain same by writing to the American Foundrymen's Association for Pre-Print No. 32-1. I believe it would be very interesting, and instructive to all of you, and you would find there the pattern specifications for first, second and third grade patterns; how each grade should be built and checked.

Another matter that has been developed in the last year or so in the designing of castings is the method by which we can cast oil holes through the castings where it is necessary. The first method developed was by casting seamless steel tubing through the casting where it was necessary to get the oil to a certain point, but there has been a newer, and I believe a cheaper and better method of putting into the mold an asbestos covered wire commonly used in electric heating apparatus.

This asbestos covered wire is bent into any shape desirable, and put into the mold just as you would a sand core. Core prints can be put on the pattern at any part to support the ends of this wire, and chaplets can also be used where necessary to support this wire inside the casting.

After the casting has been poured this wire is easily pulled out, and the asbestos covering which is left in the hole can be removed with compressed air. I believe you will find this quite convenient and desirable where it is necessary to get the oil at any particular point in a casting.

NEW FLINT CHAPTER

The tool engineers at Flint, Michigan, met November 15th at the Hotel Durant to form an A.S.T.E. chapter. Following is a report of the meeting written by the versatile Mr. James R. Cavanaugh.

Mr. Raymond Walter started the evening's activities by introducing Mr. Jack Petrill, of the Industrial Mutual Association, Flint, as master of ceremonies for the entertainment. Mr. Petrill presented Cordini and Tini of Detroit in "Musical Gestures," which included snappy and popular tunes played with flying fingers on accordian, clarinet, and saxophone. Also Betty DeAlmo, charming in her pleasingly abbreviated costume, executed graceful steps in toe dancing as well as intricate and lightning-like movements of the fast tap. These acts received a tremendous round of applause from the audience.

Mrs. C. Perim Macgregor, socially prominent in Flint, pleased her audience greatly with a number of vocal selections of a classical nature. She was accompanied at the piano by Mr. Macgregor.

Messrs. H. A. Bokram and E. P. Horan of the Cleveland Twist Drill Company presented upon the screen, "Uses and Abuses of Twist Drills," an interesting and technical picture depicting practices and problems occurring daily in shop production.

Mr. J. K. Wohlfeld, general chairman of the meeting, before introducing Mr. J. A. Siegel of the Packard Motor Company, spoke interestingly on various subjects pertaining to the Society's fundamental principles, its benefits and possibilities.

(Continued on page 11)

"See page 7 for important next meeting announcement."

CAST METAL ADVANCEMENT

By HARRY M. DIETERT*

The following paper was presented at the November meeting at the Detroit-Leland Hotel.

THE present-day perfection of machinery has been made possible by the proper selection of materials. Particular attention is being given to the selection of rolled and forged steel parts in reference to alloy specification and heat treatments to secure the exact desired physical properties.

The day is at hand when the engineer will select cast metal parts, whether ferrous or non-ferrous, and specify the proper ingredients and the necessary heat-treatment to secure the desired physical characteristics. This will insure maximum service from cast parts.

Cast metal parts are emerging from a stage in their development similar to that period in the history of rolled steel when steel was just "steel" and a bar of cold rolled steel was used for making an automobile axle. The steel age was ushered in only when the alloying of steel became popular and heat-treatments exact. Cast metal, to many, is still just a "casting," few realizing that many foundrys are in position to furnish cast parts which are up to a physical specification equalling rolled or forged alloyed steel parts.

The art of casting metal parts has progressed so rapidly in the past few years that the majority of engineers are not aware of the fact that cast metal parts respond to such heat treatments as hardening, annealing, nitriding, carburizing, and normalizing. Castings today may be purchased for varied exacting requirements such as high strength, corrosion resisting, hardness, wear resistance, shock resistance, vibration and noise, and heat resistance.

The era of cast metal parts is here, giving to the profession a new medium in machine and tool design through which the art of mass effect will be further developed. The result will be a proportioning of metal mass as required to secure the optimum strength, wear, noise elimination, vibration damping, heat flow, abrasion resistance, and other such design requirements, with a saving in total weight, production cost, ease of operation, lessened control power, and operation cost. This departure in design is at hand.

Advantages of Using Cast Metal Parts

Cast metal parts have advantages that give them a definite place in every engineering project, which is excelled by no part produced in any other manner. This is substantiated by the following facts:

An extremely wide selection of weight per unit volume is available.

A range of strength covering every practical requirement allows proper selection for securing minimum cost.

A saving of weight in a given shape is made possible by flexibility of proportioning cross-sectional mass to secure uniform strength.

An increase of strength may be secured by reinforcing by ribbing or webbing as against the strength of a flat design.

A wide selection as to heat resisting to minimize buckling, scaling, or complete failure is available.

An economical means of producing additional parts is afforded.

A means of reducing the amount of machining to obtain a required shape is available.

A means of securing a sufficient mass within a structure to absorb vibration and shocks is also provided.

A wide selection of metals which are non-corrosive to acid or akaline solutions, without unduly increasing the cost is made possible.

A selection of a metal that will give rigidity to a structure is possible.

A selection of a metal with a low permanent set is possible.

A selection of a metal that is free from the tendency of seizing is made available.

The Change in the Foundry

The term "foundry" may bring to the majority a vision of labor, molton metal, and the securing of castings by chance. The period of rest through which we have been passing has given foundries a chance to begin merchandising a new product, a casting to specifications.

This change has been brought about by numerous advancements within the foundry trade such as, 1—improved technical staff, 2—improved materials and methods, 3—improved equipment, 4—improved research facilities such as X-ray, Gamma ray, and Spectograph examination of castings, 5—improved methods resulting in the ability to meet exact specifications.

The Change in the Strength of a Casting

Gray iron parts cast to specifications are obtainable and must not be classed with the doubtful 20,000 pounds tensile strength of yesterday, but from 20,000 pounds to a controlled 60,000 pounds without resorting to heat treatment. Cast malleable parts are now being poured which have a tensile strength of 120,000 pounds per square inch.

Tensile strengths of from 120,000 to 170,000 pounds are also being obtained in the casting of non-ferrous metals by alloying and heat treating.

Strength of Cast Iron

The 20,000 pound type of cast iron is suitable only for low duty service. To secure the maximum from cast iron parts, one must specify the type required. The A.S.T.M. and A.F.A. have specifications covering iron castings as follows:

Class No.	Minimum Tensile Strength
20	20,000
25	25,000
30	30,000
35	35,000
40	40,000
45	45,000
50	50,000
60	60,000

The strength of iron castings is affected very little by thickness or mass effect of the casting. The endurance of high duty iron castings is very great, reaching ratios up to 50% of its tensile strength and sustaining loads up to 80% of its ultimate strength.

Heat Treatment of Cast Iron

Cast iron reacts to heat treatment in a way comparable to steel. It may be annealed, hardened, carburized, or nitrided with the equipment used for treating rolled or forged steel parts. When cast iron is annealed to relieve internal stresses the process is called "normalizing," or "aging." The part is heated to 800° to 950°F and held for one-half hour to five hours depending upon the thickness of the part. It is then cooled slowly in the furnace. This process decreases the hardness with slight loss in strength.

Non-alloyed parts are annealed to make them more readily machinable by heating them to 1200° to 1500°F. Alloyed parts are heated to as high as 1800°F. The strength of the casting is decreased and its hardness may be as low as 130 Brinnell.

*Chief Engineer of the United States Radiator Co. President of the H. W. Dietert Co.

"See page 7 for important next meeting announcement."

Hardening Cast Iron

Cast iron parts are hardened to increase their strength, wearing qualities, impact and abrasion resistance, to reduce their permanent set as much as one third of its original value and to bring its stress strain diagram closely to that of steel.

Quenching cast iron parts of the high duty class above 1350°F and up to 1500°F increases their hardness up to 600 Brinnell in direct relation to the rapidity of cooling. High duty cast iron parts may be defined as a pearlitic iron with well distributed small flake carbon. Parts not requiring high strength may be quenched at 350°F and up. If high strength and impact resistance are required they should be quenched and drawn. The nickle-chrome alloyed irons are air hardening while non-alloyed irons are quenched in baths such as are used for steel treating. Cast iron parts do not crack or warp more than steel. Complicated castings should be air hardened. All rough machining operations are performed before hardening and finished by grinding.

The wear resistance of iron castings is increased by nitriding in contact with anhydrous ammonia gas at a temperature of 1000° for an hour to 1½ hours. The irons found to be most suitable for this treatment are those alloyed with chromium-aluminum or chromium-vanadium. Cast iron parts may also be hardened by the nitrogen process.

The heat treatments indicated above make it feasible to use iron castings for such parts as forging dies; forming dies; gears; cylinder liners for compressors, engines and pumps; crank shafts for powerful Diesel engines and high speed automobile engines; cam shafts; and wearing plates on high grade machines.

Trade Names of Alloyed Cast Iron

Ni-Resists,—Ni-Cr and Ni-Tennsyliron containing up to 14% nickel, 5½% chromium. Show freedom from growth and scaling at temperatures up to 1500°F. Will resist acids and alkalis.

Mechanits,—A specially treated cast iron with calcium silicide to give the necessary silicon range with a low carbon mix.

Durion and Pyrocast,—A high chromium cast iron possessing special corrosion resisting power.

Ni-Hard,—Possesses exceptionally hard surface up to 625 Brinnell of white iron or chilled surface.

Sial,—High in tension. Applicable to high temperature applications.

Trade Names of High Duty Malleable Iron

Zeron Metal,—Malleable iron containing a higher manganese content than standard. It is heated to 1700°F, annealed and finally cooled in air from 1200°F. It has a tensile strength of 70,000 to 80.000 pounds and is harder than standard malleable iron.

Promal,—Standard malleable heated to 1400°, oil quenched and drawn. Stronger than standard malleable and equally as ductile.

Standard Duty Steel Castings

The cast steel parts now available are twice as strong as the ones regularly specified by most engineers today. In other words, the engineers have not taken advantage of their opportunity to secure a more serviceable steel casting of much less weight.

Cast steel parts are graded according to the carbon content or to the alloys included. The first series of grades according to carbon content are: low-carbon, regular-carbon, and high-carbon.

The second series consists of: medium-manganese, nickel-manganese, silicon, nickel, nickel-molybdenum, molybdenum, copper, and vanadium.

Carbon Grade Cast Steels

Cast steel parts containing less than .21 carbon have a tensile strength varying between 50,000 and 80,000 pounds. They may be carburized to secure surface hardness. The regular grade of cast steel has a carbon content between .22 and .35 and a tensile strength range between 60.000 and 100,000 pounds. This grade is easily heat treated to increase its strength. The high-carbon group has a carbon content from .35 to .50 and a tensile strength ranging from 80,000 to 117,000 pounds. It has the advantage of high strength and hardness.

Alloy Cast Steels

Medium manganese and nickel-manganese cast steels have a tensile strength ranging from 90,000 to 106,000 pounds. It is a low priced alloy steel. Silicon cast steel parts have good machineability and high wear resistance. Nickel cast steel parts are adaptable where subjected to impact. Nickel-molybdenum and molybdenum cast steel parts are used where great strength is required at high temperatures. Vanadium cast steel parts are used where a part is subjected to sudden loads. Copper cast steel parts have a greater strength for a given carbon content. They are also used where subjected to atmospheric corrosion. Chromium cast steels possess abrasion resistnce, heat resistance, and hardness. Chromium-tungsten cast steel possess high corrosion resistance.

Cast-To-Shape Steel Dies and Tools

The progress made in cast-to-shape dies and tools is of particular interest to tool engineers as a means of reducing the amount of machining. "Martin Steel" is the name given to a cast steel which hardens in still air as also does: "Krokoly." "Carbony" is the trade name of an oil hardening cast steel.

Conclusion

The art of casting metalic parts is rapidly advancing and ushering in a new age in which cast parts will play an ever increasingly important part in the world of manufacturing.

References—Symposium of Steel Castings, A.F.A., A.S.T.M. Symposium of Malleable Iron Castings, A.F.A., A.S.T.M. Articles by H. Bornstein, A. H. Hurst, Oliver Smalley, W. W. Kerlin, E. H. Wise, F B Coyle, H A Swartz, and R. A. Bull.

A MISSIONARY SOCIETY

Bill Fors, pilot of the Membership Committee sends the following stirring message to all of us:

The American Society of Tool Engineers has been organizd about eighteen months and is recognized as being sound in purpose and capably "officered." Its growth to date has been the most remarkable any engineering society has ever had. The reason for this is well known to all of us who have watched its progress and benefitted thereby.

It becomes our duty to tell our friends and acquaintances how much it has meant to us—and how much it can mean to them.

The meetings alone are worth more than the entire initiation fee and the yearly dues combined,—and Joe Siegel tells me he has bigger and better meetings in store for us than we have had in the past.

Then, there's the A.S.T.E. Journal. If you show any prospective member this issue of the Journal he would have to admit that it contains enough information to raise his pay a nickel an hour if he will read it and use what he learns.

It really looks as though a man can't afford **not** to belong to the A.S.T.E.

Its easy to get new members now since all tool men are back on the job and receiving pay checks regularly. Incidentally, if they want to stay on a job they should see Bob Lippard, Chairman of the Industrial Relations Committee, in case they get laid off. Our employment placement service is worth more than can be estimated.

For the balance of the year no dues are required from new members, just the insignificant initiation fee.

So, every member should give a Christmas present to someone by inviting him to join the A.S.T.E. before the hectic year 1933 becomes history. Mail your application to me at the address below or to our hard working Secretary Al Sargent, 8213 Woodward Ave.

Let's wind up the year with a flourish characteristic of the A.S.T.E. Get Your Man!

Mail his name to William J. Fors, 7219 St. Paul, Detroit, FI 0467J.

"See page 7 for important next meeting announcement."

NEW TOOLS AND PROCESSES

B. L. DIAMOND HAROLD GILLER

IDEAS FROM FRANCE

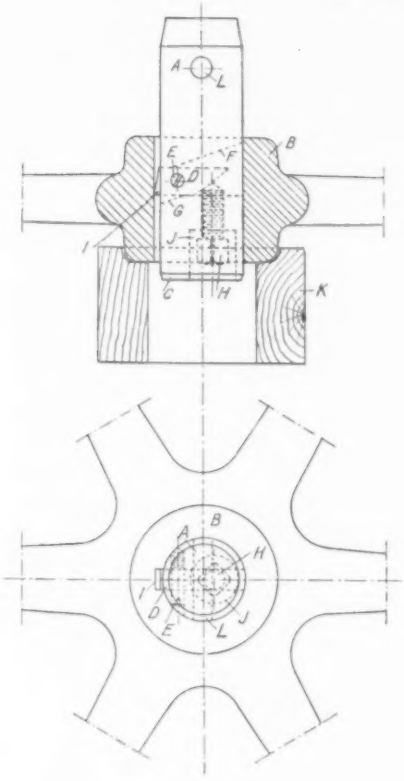


Fig. 1

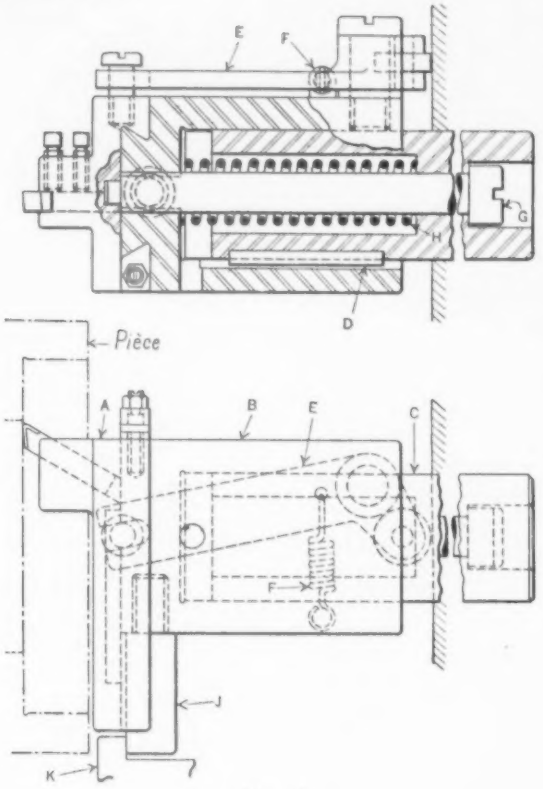


Fig. 2

THE cuts shown herewith are from the French Magazine Machine Moderne, August, 1933. Fig. 1 is an interesting keyseating tool of the clapper type, and its operation is easily seen from the cut. Note that the piece to be keyseated is shown resting on a wooden block.

Fig. 2 shows an arrangement for facing a flange or recess with a tool carried in the turret of a lathe or screw machine. The novelty in this arrangement is in that the cutting tool is operated by a lever arrangement instead of the wedge action in common use locally.

These cuts were contributed by our Secretary, Mr. A. M. Sargent.

NEW FLINT CHAPTER

(*Continued from page 8*)

Mr. Siegel related how, only two short years before, the Society was humbly brought into being by only four or five members at its first meeting. He told in simple "every day" words how these meetings progressed, each gathering nearly doubling the former in attendance.

Mr. Carpenter of the General Motors Truck of Pontiac read excerpts from the Constitution of the Society. Mr. Carpenter commented briefly on the finer points of the by-laws and regulations of the Association.

The interesting talk of Mr. Sargent, present Secretary of the A.S.T.E. seemed to this writer the high light of the evening. Mr. Sargent selected as his theme a comparison of tool and die designers and the professional world. Mr. Sargent went on to tell of the eventual day when, through the efforts of this organization, all designers will be classed by the manufacturing world in the same light as those recognized in the older professions today.

In summary, to hear these men speak is to know them personally. They spend their time and effort in this no-profit organization in such a whole-hearted manner that it is no surprise that, under their leadership, the Society grows in membership day by day.

Mr. Floyd G. Traylor was elected temporary chairman, pending permanent elections of officers at the time Detroit grants the Flint Chapter its official charter.

Mr. Traylor, Chief Tool Designer of the Buick Motor Company, has been connected with that Concern for the past eighteen years. He has entered into the spirit of the Society and what it represents with a zeal that, if followed as an example, will insure the Flint Chapter its necessary quota for a permanent charter.

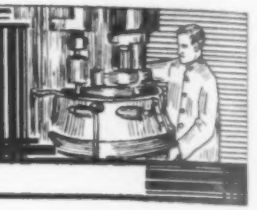
When asked at this writing for a statement, Mr. Traylor complied willingly.

"Primarilly," he said, "I a minterested in having in Flint an association that is educationally and socially qualified to educate the general public as to the real profession of Tool and Die Designing. I believe, with the A.S.T.E. nationally known, it is that association."

The next Flint meeting will be announced locally.

"See page 7 for important next meeting announcement."

NEW MACHINES



HAROLD GILLER B. L. DIAMOND

BAIRD AUTOMATIC MULTIPLE TRANSFER PRESSES

THIS type of Baird Press is the result of years of experience designing and building all kind of Standard and Special Presses needed in the quantity production of articles made from ribbon metal.

The Baird Single Transfer Presses, composed of Baird Standard Presses with a Transfer Attachment have been in use some 25 years or more and of course cover that class of work requiring transfer to one position only, after blanking.

This Baird Multiple Transfer Press covers conditions requiring that the work be transferred to several positions after blanking for the purpose of piercing, forming one or more times, lettering, embossing, etc.

In operation the Baird Multiple Transfer Press automatically feeds the material from the coil, does operations preliminary to blanking as piercing, lettering, etc., then cuts the blank, positively places the blank in the transfer fingers, positively transfers the work to the several other tool stations and finally ejects the finished piece at high speed.

The feeding of the material is by a Slide Feed the stroke of which, or amount of feed of material, is by means of a cam and this feed has a screw adjustment thus obtaining the finest degree of accuracy and in most cases doing away with the need for pilot pins and feed roll release. The grip of the feed on the metal is positive and operated by an independent cam and the pressure of this grip is adjustable.

The blanking punch enters the die only enough to cut the blank. The blank is securely held as it is carried down through the die into the Transfer Fingers by the Blank Transfer Mechanism.

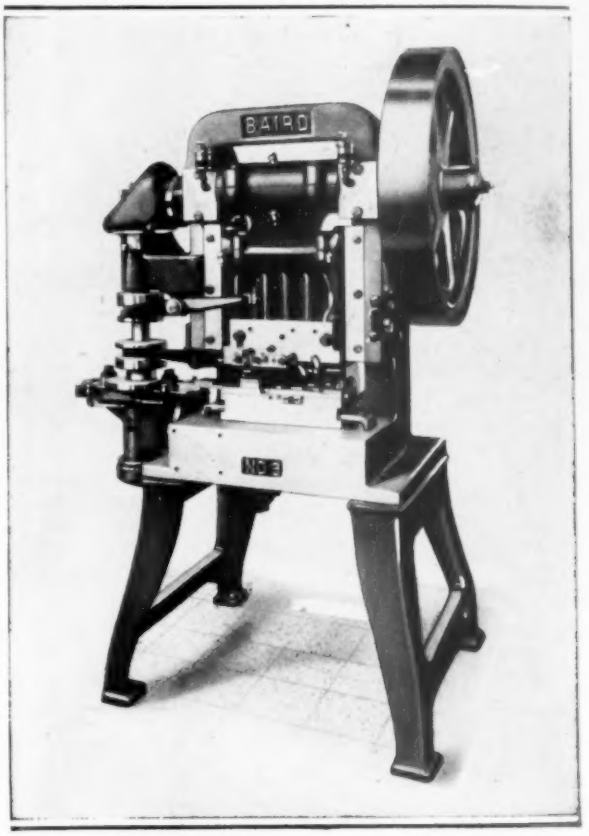
The Multiple Transfer Mechanism positively carries the work to the several successive operations after blanking and a point to note is, that in each position, the transfer fingers retain a grip on the work until the forming or other tools take hold and the work is again gripped by the next transfer fingers before the tools let go. In this way the work is positively held and controlled at all times in its passage through the machine.

All the punches or ram tools are contained in one punch holder and each is provided with independent adjustment, and all of the dies are contained in one die bed or shoe. Post tools are provided when Baird supplies the tooling.

Each pair of transfer fingers is fitted to the shape of the work as it is to be carried by it and thus the work is properly and firmly held during the transferring.

With this arrangement of tooling a set of tools consisting of the punch and die blocks with their respective punches and dies and transfer slide and fingers, is removed as one unit, without disturbing any adjustment and—in a very few minutes.

The arrangement of the Multiple Transfer Mechanism is such that different cams for different strokes for the transfer could be made at no great expense and if this feature is desired when the press is ordered, said cams can be made as split cams so as to be most readily changed. One press with additional cams arranged in this way would then cover any requirement between the greatest transfer distance with least tool stations or operations after blanking and the least transfer distance with most stations or operations that would be practicable in any one press. As the tool units are independent anyway, such a method would simply mean using the proper transfer cam and its slide with each set of tools.



A.S.T.E. THANKSGIVING PARTY A GREAT SUCCESS

You have heard the term "Perfect Setting" applied to an artists painting where he depicts the many objects required to make a picture of a certain scene. Now if you can picture a gathering of tool engineers and guests accompanied by their wives and sweethearts, to the number approximating one hundred and fifty, seated at tables, imbibing good old legal 3.2 while listening to a high-class musical program and later enjoying themselves playing several games of Keno, we think you'll agree that it also was a "Perfect Setting," or as Billy Repaid of radio fame would put it "Hot Diggidy Dog that's Kenoing."

Well that was the setting at our Thanksgiving Party held at Amaranth Hall on November 23rd. After enjoying an hour's dancing, which followed the Keno games, the committee was besieged with requests for another social event and they have expressed themselves as being agreeable to holding a dancing party in the near future.

The Meetings Committee is greatly pleased with the support given them in planning this social event and is to be congratulated for the splenedid entertainment they furnished the gathering.

The Meetings Committee wishes to thank those members who so willingly offered their assistance, and especially Perry Carlton and his String Harmonizers who furnished music that only Carlton's Harmonizers can furnish. We gladly devote this little space in recommending this musical unit to any member, or group of members, who may require such high class entertainment for any function with which they may be affiliated.

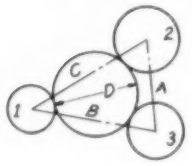
"See page 7 for important next meeting announcement."

JUNIOR ACTIVITIES

FLOYD CARLSON

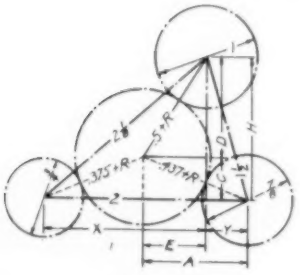
SOLUTION TO DRILL HEAD PROBLEM

In this section of the Journal issued for the month of July the following problem appeared:



In Fig. 1 find the pitch diameter D of the driving gear of a multiple drill head, when gear 1 has a pitch diameter of ¾", gear 21", and gear 3⅞", and A is 1½", B 2", and C 2⅛".

To Fred Kuphaus goes the credit for being the first to submit a solution. His solution follows. See Fig. 2.



$$X=\frac{(2\frac{1}{8})^2+2^2-(1\frac{1}{2})^2}{2\times 2}=1.5664$$

$$Y=2-X=.4336$$

$$A=\frac{(.437+R)^2+2^2-(.375+R)^2}{2\times 2}=\frac{.125R+4.05034}{4}$$

$$E=A-Y$$

$$E=\frac{.125R+4.05034}{4}-\frac{.433594}{1}=\frac{.125R+2.31597}{4}$$

$$C^2=(.437+R)^2-(\frac{.125R+4.05034}{4})^2$$

$$C=\sqrt{\frac{15.984375R+12.98741R-13.34278}{16}}$$

$$D^2=(5+R)^2-(\frac{.125R^2+2.315968}{4})^2$$

$$D=\sqrt{\frac{15.984375R^2+15.421R-1.3637}{16}}$$

$$H^2=(1\frac{1}{2})^2-(.433594)^2$$

$$H=1.4359$$

$$C=H-D$$

$$\sqrt{\frac{15.98437R^2+12.987414R-13.34278}{16}}=1.4359-\sqrt{\frac{15.98437R^2+15421R-1.3637}{16}}$$

$$2103.30739R^2+1816.007433R-2202.346105=0$$

Use Formula $X=\frac{-B\pm\sqrt{B^2-4AC}}{2A}$

Solving for R, R = .678907

Diameter of driving gear then is 1.357814".

OCTOBER JUNIOR MEETING

Mr. C. W. Balle, formerly of the Clayton and Lambert Manufacturing Company was the speaker at the Junior Tool Engineers' meeting held at the Detroit College of Applied Science, October 20th.

The subject of Mr. Balle's very interesting discourse was, "What the Junior Tool Engineer Should Know About Die Designing and Die Building." He discussed the purpose of dies, how to decide when it becomes necessary or profitable to build a die, and illustrated his entire talk by ample sketches on the blackboard.

Eighteen types of dies were pictured and discussed, first from the standpoint of the designer, next from the viewpoint of the builder.

Standard conventional types of pressure pads, guide posts, scrap cutters, knockouts, and so on, were illustrated and their application specified.

The talk was enjoyed immensely by all present.

"See page 7 for important next meeting announcement."

The advertisers and your fellow A.S.T.E. members will appreciate your courtesy in mentioning the A.S.T.E. Journal when responding to their advertising.

TECHNICAL

JOHN M. CHRISTMAN RAYMOND J. WALTER W. J. McKEEN

PRACTICAL SIMPLIFIED METHOD OF DESIGNING AN AIR CYLINDER

By D. J. McKEEN

Air or hydraulic pressure is often used to clamp the part in place in a fixture, to index the fixture, or to load or feed the machine. The actuating mechanism is usually the conventional piston and cylinder which can usually be purchased from one of several companies manufacturing a varied line of more or less standard cylinders. In special cases, however, it becomes necessary for the designer to design one to meet the special requirements of his application. The following is an outline of a procedure which has proven satisfactory in such cases.

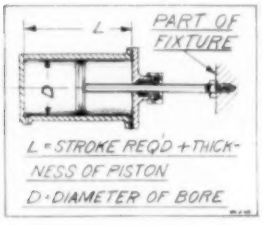


Fig. 1

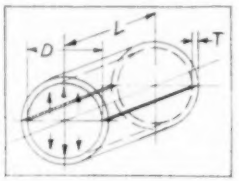


Fig. 2

The essential parts of such a cylinder are shown in Fig. 1. The designer's first step is to determine the total pressure, P, which the piston must exert. The nature of the application will determine this as well as the length of stroke. The next step is to determine the pressure available from the pipe line which is to supply the cylinder. This pressure per square inch we shall indicate as p.

The diameter, D, of the piston is next determined by the following formula:

$$D = 1\tfrac{1}{8}\sqrt{\frac{P}{p}}$$

If work is to be done on the return stroke of the piston an allowance should be made for the cross sectional area of the piston rod, since this area is non-effective for producing pressure.

To determine the cylinder wall thickness it should be considered that the internal pressure tends to split the cylinder longitudinally into two parts having an appearance similar to two bearing caps. The total pressure, P^1, acting on each of these halves tending to separate them is $P^1 = pDL$, where L is the length of the cylinder.

Let us assume that we are to design a 6" diameter cast iron cylinder 10" long to operate on a line pressure of 90 pounds, and that we will use a factor of safety of 20. Then p=90, L=10, and D=6, and the total pressure P^1 tending to rupture the wall will be $P^1 = pDL = 90 \times 6 \times 10 = 5400$ pounds.

The total area of the cross section of the cylinder wall which must carry this load is shown shaded in Fig. 2. This area, A, is determined by dividing the actual pressure P^1 by the ultimate tensile strength, S, of cast iron and multiplying the quotient by the factor of safety, thus:

$$A = \frac{P^1}{S} = \frac{5400}{20{,}000} = 5.4 \text{ square inches.}$$

The area of one side of the cross section of the wall is one half of this total area, or 2.7 square inches. Since the length is 10" the wall thickness will be $2.7 \div 10 = .27$ or approximately 9/32".

If the cylinder heads are held on by screws, their cross sectional area at the root diameter must be determined to withstand the tension exerted by the total pressure, P, on the piston. This pressure tends to blow the heads off by rupturing the screws due to tensile stress.

The diameter, d, of a mild steel piston rod is determined by the formula $d = .112\sqrt{Dr}$, where r is the length of the piston rod measured from the piston to where it contacts the device it operates. Let us assume that the length, r, in a certain case is 12". Then the diameter of the rod will be

$$d = .112\sqrt{6 \times 12} = .95", \text{ say } 1".$$

NEWS OF INDUSTRY

E. R. DeLUIZ

MacCauley & Madison Inc. Change Location,—For fifteen years this Company has been selling drafting supplies and doing blueprinting from its location on East Elizabeth Street. Since October 23rd its new location has been 162 Bagley Avenue, in the United Artists Building.

Die Castings.—Planning, designing, making, and selling for profit through the use of zinc die castings is comprehensively presented in a well-prepared booklet of New Jersey Zinc Company, New York. The booklet includes a general discussion of the problem, the properties of zinc die castings, a discussion of the designer's influence on selling, and descriptions and attractive photographs of many types of die casting applications.

Chrysler sales to dealers in October, 34,170.—Sales to distributors and dealers of Chrysler Motors during October were more than ten times the sales during October of last year. During this October the total number of passenger and commercial vehicles sold by Chrysler Motors amounted to 34,170, as compared with 3,268 during last October. These figures include Plymouth, Dodge, DeSoto and Chrysler passenger cars, Dodge trucks and taxicabs, and Fargo motor coaches. Sales to distributors and dealers during the first ten months of this year were 2⅓ times what they were during the first ten months last year. The total number of passenger and commercial cars sold this year amounted to 420,760 units, as compared with 177,671 units in the corresponding period of 1932.

"See page 7 for important next meeting announcement."

Ford reopens five steel furnaces.—The Ford Motor Company has reopened four of its nine open-hearth furnaces which have been nonproductive for a year and a half. Under the plan foreseen by observers in Detroit, the Ford furnaces will soon be placed in full operation to combat the rising steel prices. Ford steel is reported to have risen $10 a ton in recent weeks. The furnaces now in operation comprise about 25% of the capacity at the Rouge Plant. Full operation of all of the furnaces there would supply Ford needs with the exception of sheets or strips. No information was available as to whether or not additional furnaces will be put back into service in the near future. It is not thought likely that Mr. Ford would start production of steel beyond his own needs.

Court upholds NRA minimum wage scale.—Under a ruling in Detroit on November 14th, by Judge Gerald W. Gorat in the Court of Common Pleas, employes who do not receive at least the minimum wages specified in the codes which their employers signed, may sue for the deficiency in court. The judge awarded a judgment in a similar case and assessed the employer $2.00 costs in addition. This decision was the first in a case of this nature to be brought in the state.

MEMBERSHIP COMMITTEE HELPS ORGANIZE FLINT CHAPTER

THE last month has seen two outstanding committe efforts, the first one being the effort of the Membership Committee to establish a new chapter in Flint, Michigan. The Meetings announcements in this Journal carry particulars. The City of Flint has long been famous as a mass production center, so it was to be expected that the first branch of the mother section should sprout in that fair city. We are all rooting for you, Miss Flint! May you always lead!

Meetings Committee Shines

The well-laid plans of the Meetings Committee were rewarded with success on the evening of November 23rd when an unusually large crowd of ardent members and their friends, wives, and sweethearts enjoyed the feather party and dance given at Amaranth Hall. Chairman Joe of this committee reports a goodly gain in the financial status of this "non-profit" committee. (That means we'll probably have better and more cigars at the next banquet.)

Industrial Relations Committee Needs Designers

The Industrial Relations Committee startles us all with the announcement that there are not enough applicants to meet the demands for Tool Designers, Die Designers, and men of kindred leanings. Speaking of "relations" and "kindred" reminds us that "we are all brothers in this great fraternity" as Andy would say, and should advise this committee of any un-attached designers we happen to encounter in our daily travels. Every designer should keep this committee advised of his where-abouts by filling out, and keeping up-to-date, the cards provided for this purpose. In this manner we can render a service to the employers of our members and merit their continued cooperation.

American Institute of Electrical Engineers

1933-34 PROGRAM

Dec. 12, 1933—The Detroit Edison Auditorium.
Subject—"The Moons of Jupiter"—(a motion picture)
Speaker—Mr. Robt. R. McMath
McMath-Hulbert Observatory,
Lake Angelus, Michigan.

Jan. 23, 1934—The Michigan Bell Auditorium.
Subject—To be announced later.
Speaker—To be announced later.

Feb. 27, 1934—The Detroit Edison Auditorium.
Subject—"Fundamental Phenomena in Mercury Vapor Tubes."
Speaker—Dr. A. W. Hull,
Asst. Director, Research Laboratory,
General Electric Co., Schenectady, N. Y.

March 27, 1934—Ann Arbor, Michigan.
Subject—"Something About Distribution."
Speaker—Mr. Howard P. Seelye,
Engineering Division The Detroit Edison Co.

April 25, 1934—The Detroit Edison Auditorium.
Subject—"Lightning and Surges."
Speaker—Mr. H. W. Collins,
Assistant to the Supt. of Electrical System,
The Detroit Edison Company.

May 15, 1934—The Detroit Edison Auditorium.
Subject—"Cable Insulation."
Speaker—Prof. J. B. Whitehead,
John Hopkins University,
President of the A.I.E.E.

"See page 7 for important next meeting announcement."

IDLE TIME

From G. F. PETERSIMES

We regard machine time as idle time from the standpoint of motion analysis. If you will balance operations on a lathe or any similar piece of equipment you will find the operator watching the cut or simply doing nothing for from 50 to 75 per cent of the time. After a job has been properly balanced I have seen one operator rough-turning shafting, finish-grinding the piece and at the same time machine-drilling a hole through the length of a shaft on another machine. While the loss of machine time waiting for the man has to be considered in balancing such operations, on this particular job it was less than 10 per cent. Original piece rates were reduced 55 per cent and operator's earnings increased 18 per cent. If a job will not balance within 15 per cent on machine tools which carry a high capital investment, it isn't good practice, in our opinion, to combine machine operations. Instead we combine a hand operation with that of a machine.

In making theO motion analysis, the first question to be answered is of course whether the operation itself is necessary, or can be replaced by a faster or more economical process.

The next step is to make sure that the machine operation is correctly standardized. Tool steels should be standardized. Tools should be dressed in standard shapes and kept sharp by a separate tool-grinding department, not by the workman. Machines of sufficient strength and rigidity to use these cutting tools to full advantage should be provided. Tables should be worked out showing the amount of metal removed for the various feeds, speeds and shapes of tools to be employed. In this study we follow the methods evolved by Taylor and the group of men who worked with him.

A primary principle of motion economy is the law of balance. An excessive expenditure on machinery to secure a small saving in labor time would be an illustration of an unbalanced expenditure. The right cutting speed is found at the point of economical balance between life of the tool and rate of cutting. The relationships of the various expenditures for equipment, labor and material cost for lowest total cost can, if desired, be expressed quite exactly by formulas.

In studying and standardizing manual operations, we used to rely exclusively on the stop watch. But for the accurate analysis of true elementary times such as those mentioned, the stop watch is too slow and clumsy an instrument. Also, particularly on short and fast operations, the stop-watch observer is so busy recording operation times that he has no time to think about how to improve the operation.

The plan we now use is to watch the operation cycle and make a record of precisely what each hand or moving part of the body is doing. This method of recording is similar in principle to that used in the Gilbreth simo-chart, but differs from the latter in several respects. Although conventional symbols for the operation elements are used, the observer attempts to describe the element in sufficient detail so that it can be reproduced by reference to the chart and the workplace and setting used. A second important difference is that the elementary times ("chargeable time") instead of being obtained by direct observation of a stop-watch or moving-picture record for each case, are computed either directly from, or by combination of, carefully determined standard elementary times. Thus the first motion shown for the left hand—"Hand to center of roll to be picked up"—is a motion of the whole arm, for which .00360 minutes of time is allowed.

The classification of motions we are using is as follows: TRANSPORT — GRASP — HOLD — RELEASE — PREPOSITION — POSITION — INSPECT — SELECT — PLAN — DELAYS — ASSEMBLE. These elements are indicated by abbreviations.

Some of the elementary motions listed in such a study will be variable, not occurring in every cycle or differing in range or in other details. Some of these variations are minor and can be neglected, others must be taken into consideration, by averaging to find the normal cycle. The total time for operation will consist of the sum of these elementary times, after making such corrections and allowances.

This is the method by which the operation is analyzed and the standard time is determined. There is as yet, however, no assurance that the operation itself is being done in the best manner.

The problem of improving an operation is essentially one of invention, and there is no infallible method of being sure that the one best way has been finally discovered. But there are a number of general laws governing effective motions and operations, and the operation may often be improved by studying it critically to see whether in any of its elements it violates these laws.

Each element in the motion-time analysis will be scrutinized to see whether there is unbalanced activity. Compare for example a planer and a milling machine. The planer platen transports the load or work past the cutting tool, through the cut, and back idle, or empty so far as doing work is concerned. A planer-type milling machine does not transport empty, since the load is being transported or crowded into the milling cutters at all times during the machine operation.

In one instance three foundry operators were working a molding machine on match-plate work on a piece-work basis, averaging 130 molds per hour. A time study showed the three men to be out of balance. A short motion-time analysis balancing each hand of each operator, readily demonstrated, without the aid of a stop watch, that one operator was simply keeping the mold in place with his left hand for about 40 per cent of the time of the total cycle. It was simple to devise an automatic air-operated clamp which made the left hand available for more valuable work. Whenever you find a holding operation performed by the operator, instead of equipment, you may look for lost time.

The whole operation took only 0.2 minutes. It would have been difficult indeed, with three men working, to have caught the time lost by this left hand by means of usual time-study methods.

Other instances of savings of 70 per cent or more could be cited. The individual cases are significant only in indicating how the method is applied, and the important thing is not to imitate a particular case. It is rather to become so thoroughly steeped in the principles of motion-time analysis that one unconsciously applies these principles to every action, every situation in business and indeed in life.

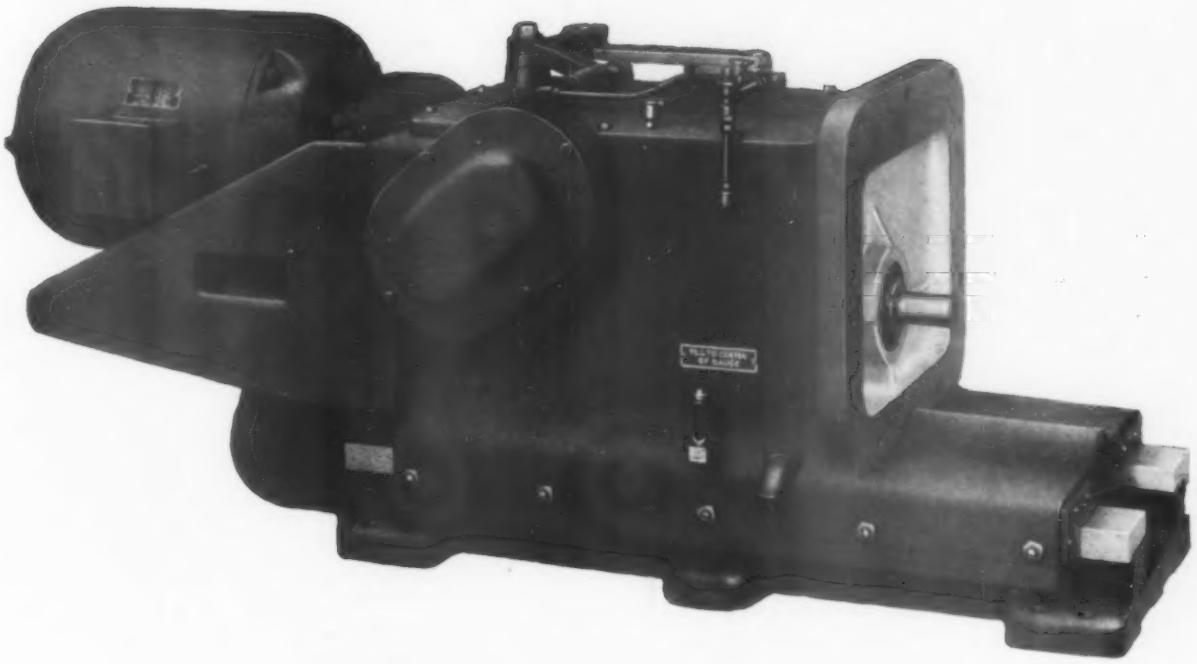
The right place to start this analysis and training is not with the man at the machine, as is so generally done. The start should be made by training the supervisors.

The important thing in motion study is not the time record. That is only an incidental by product of a method of observation. The power of observation precedes that of analysis, and the value of both observation and analysis depends on the ability to instruct others. Once able to transfer the skill developed, it is easy to build new standards or methods. The great value of motion study is that it develops, both in supervisors and operators, the habit of testing the performance of every task by the laws of motion economy.

"See page 7 for important next meeting announcement."

FOOTBURT

CAM FEED UNITS



FOOTBURT cam units, self-contained and individually operated, provide an economical means of building up production machines for multiple spindle drilling, reaming, spot-facing and similar operations.

Their use greatly simplifies the design of new machines as well as the changing or rebuilding of machines already in use to meet the increasing demand of model changes. There are four sizes, the 10″ illustrated above, a smaller 6″ size and the two larger 14″ and 16″ sizes. The sizes represent the diameter of the solid drum cam.

Why not send us a blueprint of your drilling job? We will be glad to figure with you on FOOTBURT Way Drills made up with these units.

THE FOOTE-BURT COMPANY . CLEVELAND, OHIO

We wish you all

A Merry Christmas

... and a ...

Happy New Year

American Society of Tool Engineers